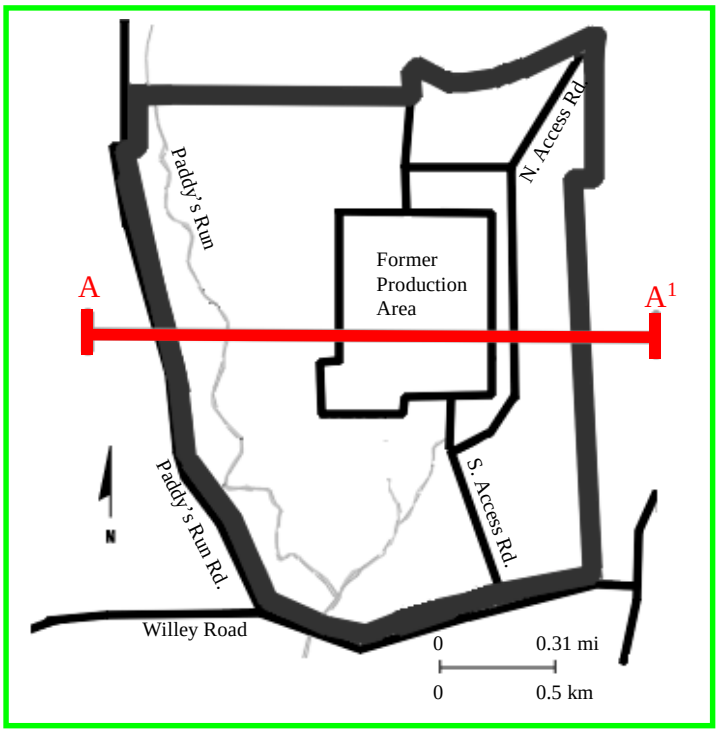
Vadose Zone Fact Sheet
Fernald Environmental Management Project

Background: The Fernald Environmental Management Project (FEMP) is a 4.3 km^2 (1,050 acre) facility located 29 km (18 mi) northwest of Cincinnati, Ohio. Fernald processed uranium metal and thorium for the nation's defense programs. Currently the site is undergoing environmental restoration.



Issues: The vadose zone is relatively thin and it is actively being remediated.

Vadose zone infiltration: Glacial sediments exposed at the surface have relatively low permeability, so most of the precipitation is lost to evaporation and surface water runoff. Limited infiltration occurs along the upper weathered portion of the glacial sediments and in isolated areas where more permeable deposits of silt, sand, and gravel are the primary surface materials.

Vadose zone characterization/remediation: Fernald is in the active remediation phase. Contaminated soils are being excavated and disposed in an on-site disposal facility or shipped off-site. Waste pit contents are being excavated, thermally dried, and shipped off-site.

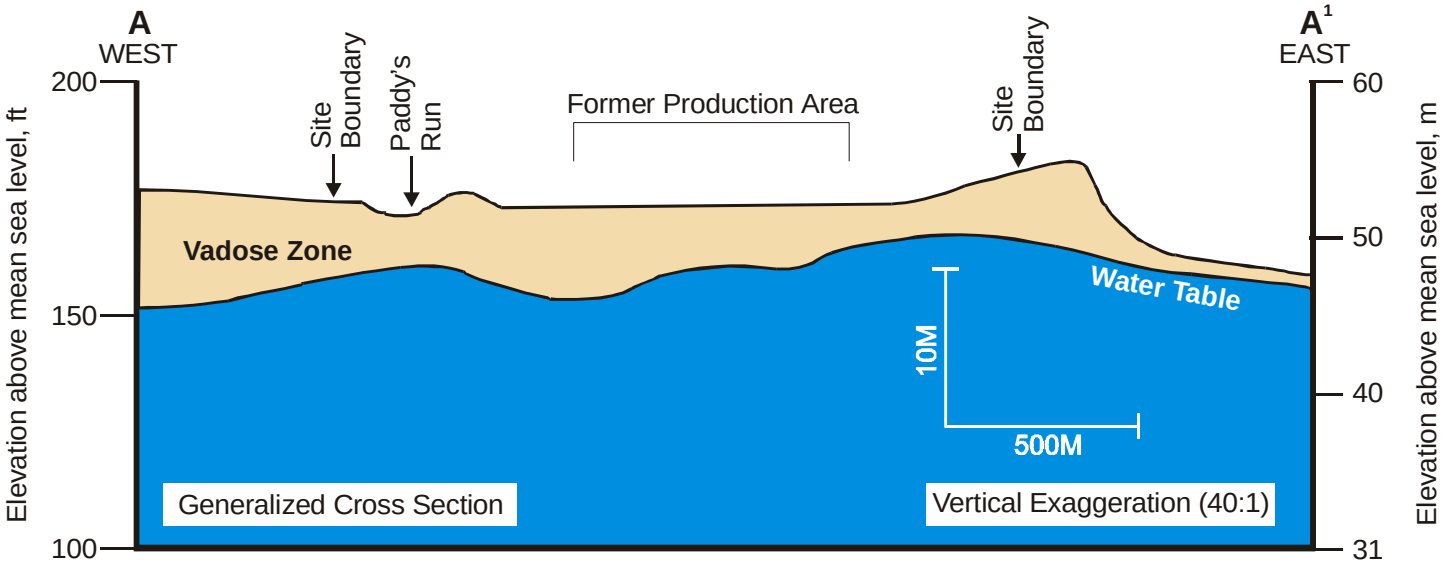
Precipitation: The regional climate is classified as continental, with an annual precipitation of 103 cm (40.6 in).

Surface Water: The FEMP site is situated on a relatively level plain. The Paddy's Run flows southward along the entire western boundary of the FEMP site. The stream is intermittent and is generally dry during the summer months.

Geology: Glacial sediments generally from 6 and 9 m (20 to 30 ft) thick are exposed at the surface. Underlying the glacial sediments is the Great Miami Aquifer, which is in a 20 m (66 ft) thick sequence of sand and gravel. Bedrock underlies the aquifer. The Great Miami Aquifer, a sole-source aquifer, is categorized as a Class I aquifer.

Vadose Zone Thickness: The vadose zone ranges in thickness from 1.5 to 15 m (5 to 50 ft).

Major contaminants of concern: Uranium, thorium, radium, lead, and a variety of organic compounds, including semivolatiles, volatiles, and PCBs.



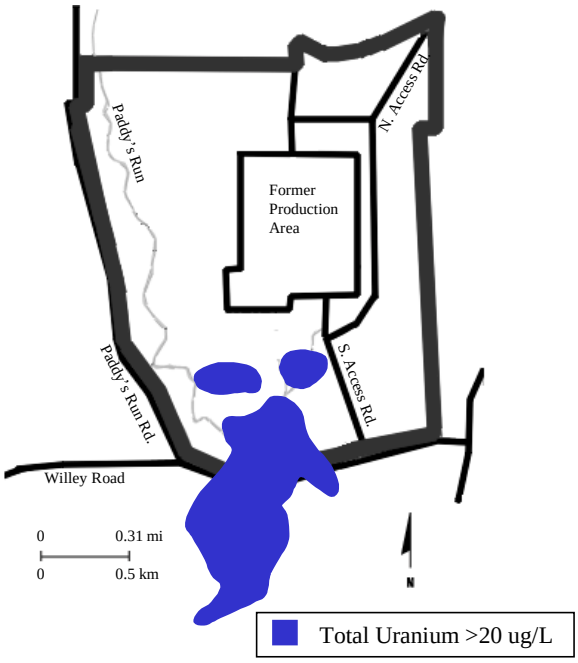
September 2000

Ground Water Fact Sheet
Fernald Environmental Management Project

Background: The Fernald Environmental Management Project (FEMP) is a 4.3 km^2 (1,050 acre) facility located 29 km (18 mi) northwest of Cincinnati, Ohio. Fernald processed uranium metal and thorium for the nation's defense programs. Currently the site is undergoing environmental restoration.

Hydrogeology: The Fernald site is located over the Great Miami Aquifer, which is designated as a sole source aquifer and considered a valued natural resource. Ground water is contaminated with uranium above background concentrations south of the site. Where the glacial overburden has been eroded by the Great Miami River and its tributaries or man-made breaches, precipitation and surface water runoff has migrated into the Great Miami Aquifer, permitting contaminants to be transported to the aquifer as well. Ground water velocity ranges from 10 to 25 m (33 to 83 ft) per year. The ground water flow is predominantly west to east except for the southern portion of the site that has a southerly flow direction.

Issues: A portion of the plume is off-site under private property. Fernald provided bottled water for residents in the south plume area until 1996 when a public drinking water system became operational. Waste pits are either in close proximity to, or in contact with, the Great Miami Aquifer and are contributing to contamination of the ground water.



Ground Water Plumes in Great Miami Aquifer

Ground Water Characterization/Remediation: Fernald has completed site characterization and remedy selection, and is involved in the remedial design and implementation phase of remediation. The remedial objective for cleanup is concentration based, not mass based, while ensuring protection of human health and environmental protection. In 1993 the South Plume Removal Action was started to slow off-site migration of contaminated ground water. During 1998, active restoration of the Great Miami Aquifer began with key portions of the enhanced ground water remedy coming on line. CERCLA five-year reviews will evaluate the effectiveness of the remedial approaches.

Ground Water Use: The current ground water use is residential and industrial.

Plume Type	Depth	Remedial Approach
Uranium	0 to 46 m (0 to 150 ft)	Pump and treat; uranium removed using ion exchange resins; re-injection of treated ground water